BIRTH-FRACTURE OF THE SKULL.

FAMILY OF THREE, ILLUSTRATING THE EFFECTS OF OPERATIVE TREATMENT.

BY JAMES H. NICOLL, M.D.,

OF GLASGOW,

Professor of Surgery in Anderson's College.

FIG. 1 is a photograph of a family, taken recently, to which are appended the respective ages, and the dates of operation. All presented a depressed (greenstick) fracture of the skull in the left frontal region, the result, apparently, of injury by compression against the maternal pelvis during delivery. Fig. 2 is a photograph of the youngest member of the family, and a photograph of the second child (forming one of a series of such cases) will be found in the *British Medical Journal* for December 19, 1903. The site, size, and shape of the depression were practically identical in the three.

None of the three had been treated at birth by Munro Kerr's manual moulding method. None showed evidence of spontaneous improvement, though the eldest was kept under observation for two months before operation.

Operations and Results.—In the case of the eldest, operated on some four years ago, the depression was elevated by metal elevator and bone hook. It proved, however, so resiliant that, while it was comparatively easy to elevate it, it was impossible to prevent the bone springing back into its former depressed site. An attempt to obviate this tendency by over-correction of the deformity resulted in the area of bone breaking up into several segments, and, as each of these still remained depressed against the dura, they were excised. The result in this case is a gap in the bony skull, which, though lessening in area by growth of the surrounding bone, still exhibits cerebral pulsation in an area of about three-quarters of a square inch.

In the case of the two younger children the method of operation followed was inversion of the depressed areas of bone, measuring respectively two and two and a quarter inches in diameter.

The result, in both cases, was the usual rapid union of the young growing bone (union firm at the end of one week, when the scalp sutures were removed), with complete correction of the deformity.

Remarks.—Depressed (greenstick) fracture of the skull is comparatively common in infants and young children. I have treated by operation twenty-three such cases. Of these five were traumatic, from falls or blows after birth, and eighteen the result of difficult labor. The ages at operation of these cases ranged from three weeks to eight years.

In symptomatology the cases have varied. In a number, apart from the deformity, there have been no symptoms. In two there were "convulsions," doubtfully due to the depression, and persisting in one after successful operation for the deformity. In two others epileptiform convulsions were, also doubtfully as the convulsions were general, attributed to the depression. Both of these cases were, apparently, cured of the epileptic affection, but at a period so long after remedy of the deformity that it is reasonable to view the recovery as quite as probably due to the lapse of time and the medical treatment carried out as to the operation. In one, a child of three, there was acute tenderness over the depression, which disappeared after operation. In another, a child of five years, there is mental deficiency. This is said by the parents to have shown marked improvement since the operation, some two years ago, so much so that recently at the urgent request of the parents a similar area on the opposite side of the skull was dealt with (on this occasion by cranicctomy), with what result is not yet apparent. One case presented a fluid swelling, occupying part of the depression, and becoming tense when the child cried or struggled. At the operation this was found to be a collection of cerebrospinal fluid under the pericranium communicating with the subdural space through a linear gap in the bone and dura over the dome of the depression. This case, and three others, presented laceration of the dura, patent or healed. In the majority of the cases the dome of the depression when excised (*i.e.*, the internal table) has presented either

actual greenstick splintering or evidence of that having taken place.

The Method of Operating.—In the earlier cases this was by elevation, and in these cases various methods were practised. In some the scalp was raised as a flap, or by linear incision; in others simply punctured to admit an elevator or other instrument. In some the elevator was introduced under the depression from a small aperture made in the bone near the periphery of the depression or through a neighboring suture, in others the bone hook or other instrument was introduced through an aperture made in the centre of the depression. In some the depressed area was dealt with as a whole, in others after being cut, crucially, into quadrants. Of such methods practised in very recent cases, very young infants with pliant bones, and before the deformity has become "set," I have had no experience. In the cases with which I have dealt (ranging from two months to eight years after the injury) the results of such methods have been disappointing, so much so that I gave them up, and in two cases (*vide Glasgow Medical Journal,* February, 1901) excised the major portion of the depressed bone.

In the last ten cases operated on the method employed has been inversion of the depressed area. For the purpose I employ circular, parallel-sided trephines, ranging from one and a half to two and a half inches in diameter. These trephines are armed with rim-flange stops or guards adjustable by screw, which permit of rapid cutting without risk of injury to the dura. In one of the cases I made use of a Stelwagon trephine, cutting out a disk of three and a quarter inches diameter. For future trial in such cases, Messrs. Down Brothers have fitted for me a Stelwagon trephine to a steel brace. It is in no way detrimental to the reputation of an instrument intended for cutting semicircles to say that for cutting circles Stelwagon's trephine is inferior in speed and safety to a circular trephine with flange guard. It is, however, a simple and cheap instrument, which, with care and time, may be made

to cut a circle in the child's skull of any size up to, at least, four inches diameter.

The steps in the operation are, briefly, (1) Expose the depressed area by reflecting scalp and pericranium together, by flap or linear incision; (2) cut out the depressed area by the trephine; (3) invert it on a sterile swab or towel, and by thumb pressure reduce the bend as far as may seem to correspond with the natural curve of the skull; (4) replace it, still inverted, on the dura, and (5) secure the scalp over it by means of silkworm sutures, leaving sufficient space here and there between the sutures for natural drainage.

The rate of union of the inverted disk is rapid. In all ten cases bony union, so far as palpation demonstrated, was firm at the end of a week, when the original dressing was removed to withdraw the scalp sutures.

The operation is trivial. Of the ten cases, seven were treated throughout as out-patients after operation, two of the seven being the youngest members of the family E. (Fig. 1.)

Conclusions.—A survey of the literature available, and the experience of a number of cases seen, and particularly of the twenty-three cases operated on, appear to me to warrant the following conclusions:

(1) That the statement made by a number of authors to the effect that, in the majority of cases, depressed greenstick fracture of the skull in infants rectifies itself if left alone, lacks substantiation. It is certainly no more true of the traumatic (as opposed to the parturition) greenstick fracture of the skull than it would be if made of any other greenstick fracture in the body. In regard to the parturition cases it may be true of some, viz., the slighter, cases of indentation, which may spontaneously disappear within a day or two of birth. In the more marked cases I cannot but regard such a statement as misleading. In cases over one month old, after the deformity has become "set," its spontaneous obliteration must be regarded as problematical, and as being, at best, both slow and partial.

(2) That in cases of greenstick depressed fracture of the

skull in infants and children which have not, when recent and soft, been remedied by Munro Kerr's method, operation is justifiable even if only for the correction of deformity. The excision of a nævus of the face or a small keloid scar from the neck is an everyday surgical procedure. The deformity of a cranial depression is quite as unsightly as either, and is the cause of much more anxiety to the parents, who attribute any little real or imaginary eccentricity of the child to his "queer head," while the operation for its correction is no more serious than is the removal of the nævus or the keloid. The twenty-three cases on which I have operated recovered without a death, many of them as hospital out-patients.

(3) That of the two methods available, elevation and inversion, the latter is decidedly the better, alike in the freedom from risk and the perfection of the result obtained.